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Community composition and diversity of soil oribatid mites (Acari: Oribatida) in karst forests in Shibing, Guizhou, Southwestern China

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Abstract: 【Aim】This study was carried out to gain an understanding of the distribution and composition of oribatid soil mites in karst areas in Shibing, Guizhou, Southwestern China. 【Methods】We examined the effects of forest management and forest type on the abundance, species diversity and community structure of oribatid mites in Shibing karst areas. Eight sites were chosen to represent typical forest types in the study area, including three natural evergreen and deciduous broadleaf forests, two coniferous plantations, one natural coniferous and broadleaved mixed forest, one planted bamboo grove and one natural shrub in a valley. Nine soil samples were collected at each site. The oribatid mites were extracted by a Berlese-Tullgren funnel over 24 h in August 2012. 【Results】The results indicated that *Perscheloribates* and *Protoribates* were the most abundant genera collected in the eight sites in Shibing karst areas in Southwestern China, accounting for 22.48% and 11.45% of the total catch, respectively. *Protoribates*, *Epilohmannia*, *Oppiella*, *Suctobelbella* and *Tectocepheus* were the most widespread in eight sites or seven sites in this region. The oribatid faunal exhibited characteristics of pantropical and subtropical regions at the genus level. Sites with natural evergreen and deciduous broadleaf forests supported rich individuals and genera, whereas the highest Shannon and lowest Berger-Parker indices were observed in coniferous plantations. The oribatid assemblages at all sites were dissimilar, even between sites of the same vegetation type. The oribatid communities were particularly and significantly variable in evergreen and deciduous broadleaf forests. 【Conclusion】The species diversity and community stability of oribatids are affected by the unique characteristics of karst ecosystems in Shibing, and the natural evergreen and broadleaved deciduous forests serve as an ecological "ark" for preserving oribatids in this ecosystem.

Key words: Oribatid mites; community composition; species diversity; karst area; Shibing; Southwestern China

1 INTRODUCTION

The karst in Southwestern China forms one of the three largest regions of almost unbroken karst worldwide. Locally, specific geological evolutionary processes have created this fragile and unique environment unlike karst regions in South-central Europe and Northeast America (Wang *et al*., 2003). Here the environment is unstable, with the characteristics of low environmental capacity, high eco-sensibility, and weak antijamming capability (Tu, 2000; Zhang *et al*., 2002; Wang *et al*., 2003). Population pressure and related unsustainable anthropological activities (*e. g*., removal of forests for conversion to arable land, unsustainable groundwater withdrawal, overgrazing) have led to a serious deterioration of environment conditions in these areas with large expanses of exposed bedrock (He *et al*., 1996; Wang, 2003).

Soil and vegetation in the karst mountain areas of Southwestern China are obviously fragile when compared with those in non-karst areas (Wang *et al*., 2003). The slow formation of soil and the very thin soil that adheres poorly to the bedrock make these areas very susceptible to water loss and soil erosion (Xie and Yang, 1998). Forest restoration is difficult after being destructed in the areas with rock desertification mountain, steep slopes and deeply incised valleys, and only brushwood or shrubs may

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arise (Zhang *et al.*, 2002; Wang, 2003). Currently, forest coverage averages 6% - 8%, and the majority is the planted forest in this region in China (Tu, 2000; Lu, 2001; Wang, 2003). The natural karst forests of this area have been seriously modified, and only a few well-preserved examples remain in the Shibing and Maolan karst-based Nature Reserves in Guizhou Province (Tu, 2000).

Oribatid mites (Arachnida, Acari, Oribatida) represent one of the major acarine groups and occur in various habits and most commonly in soils (Balogh and Balogh, 1992) with high diversity (Arroyo *et al.*, 2005; Zaitsev, 2013). These saprophagous and mycetophagous species play an important biological and ecological role in soil ecosystems as primary decomposers of soil organics (Maraun *et al.*, 2007; Norton and Behan-Pelletier, 2009).

The community composition of the oribatid mites has been shown to respond strongly to changes in habitat and land use (Nielsen *et al.*, 2010). The abundance, species distribution and community structure could show spatial variation at different hierarchic levels (Lamoncha and Crossley, 1998). The biodiversity and community structure of oribatid mites have been studied frequently in many ecosystems (Maraun and Scheu, 2000; Liu and Yang, 2003; Melamud *et al.*, 2007; Winchester *et al.*, 2008; Ivan, 2009; Liang *et al.*, 2010). A number of studies have attempted to clarify the relationships among the biodiversity, the community structure of these animals and related environmental factors. The studies cover a wide range of subjects, such as geological age (Zaitsev *et al.*, 2013), soil properties and precipitation (Nielsen *et al.*, 2010), and land use types (Lee *et al.*, 2009; Seniczak *et al.*, 2009; Maribie *et al.*, 2011). Previous studies have shown that environmental factors affect mite communities in many ways, and these factors are not independent of one another (Lamoncha and Crossley, 1998). With increasing of human activity, a better understanding of the effects of human disturbance on soil quality and fauna on different spatial-temporal scales is critically important to protect the biodiversity (Lee *et al.*, 2009). However, no such studies cover the oribatids in karst areas in Southwestern China.

Shibing karst is a representative of geomorphology with dolomite of karst areas in Southwestern China. The area is approximately 282.95 km^2 (27°12′00″ - 27°10′12″N, 108°06′00″ - 108°07′12″E) and experiences a semi-tropical humid monsoon climate (Li *et al.*, 2010). Mean annual precipitation is 1 000 - 1 300 mm with a mean annual temperature of 16.4℃ (Yang and Liu, 2004). The area has a variety of microhabitats because of its rugged terrain. Because of limited human disturbance, natural karst forests remained in the area (Li *et al.*, 2010). In general, 80% of wild plants and animals in China live in forests (Fu *et al.*, 2008). The natural karst forests may be a refugium or "ark" for soil animals in karst areas in Southwestern China, where some studies on animals and plants have been completed in recent years (Huang, 1995; Yang and Luo, 2013); however, these studies did not cover the community structure of oribatid mites.

This study aimed to generate an understanding of the distribution and composition of the soil oribatid communities and to reveal the effects of different forest types on the abundance, species diversity and community structure of oribatid mites in such areas.

2 MATERIALS AND METHODS

2.1 Study sites

Eight different sites representing the predominant biotopes were selected based on the predominant plant community and land use in three scenic spots of Shibing County (Table 1): the Yuntai Mountain scenic spot, the Heichong and Shamu scenic river spots. These sites comprised three natural evergreen and deciduous broadleaf forests, two coniferous plantations (*Pinus massoniana*, *Cunninghamia* sp.), one natural coniferous and broadleaved mixed forest (*Cupressus funebris*), one planted bamboo grove and one natural shrub of valley.

2.2 Soil samples and oribatid isolation

Soil samples were collected from the eight sites in August 2012. Nine soil samples were randomly selected in each site (72 samples in total of 100 cm^3 each). Soil samples were collected with a soil corer (φ 5.045 cm) at three depths (0 - 5 cm, 5 - 10 cm, and 10 - 15 cm) for all samples. The oribatid mites of the soil samples were extracted by a Berlese-Tullgren funnel over 24 h. The isolated oribatid mites were stored in 75% ethanol, cleaned with lactic acid and then identified to genus under a microscope according to Balogh and Balogh (1992) and classified using the system proposed by Subías (2004).

The voucher specimens were deposited in School of Life Sciences, Guizhou Normal University, Guiyang, Guizhou, China.

2.3 Data analysis

Richness (s) was measured as the number of genera at each site; diversity was measured with the Shannon-Wiener's index (H'), which is calculated with $H' = -\sum P_i \ln P_i$; evenness was measured with

Table 1 Natural conditions of the eight sampled sites in Shibing, Guizhou

Site	Forest type	Location and elevation	Soil
I	Natural evergreen and deciduous broadleaf forests; the representative plants: *Cinnamomum saxatile*, *Quercus dolicholepis*, *Carpinus turczaninowii*, *Cotinus coggygria* var. *pubescens*, *Rhizoma cibotii*; located on the top of the mountain.	Yuntai mountain scenic spot, 957 m	Thin limestone soil
II	Natural evergreen and deciduous broadleaf forests; the representative plants: *Choerospondias axillaries*, *Kalopanax septemlobus*, *Cerasus clarofolia*, *Bothrocaryum controversum*, *Rhus chinensis*; located in the mountain bay.	Yuntai mountain scenic spot, 943 m	Thin limestone soil
III	Natural evergreen and deciduous broadleaf forests; the representative plants: *Cyclobalanopsis glauca*, *Phoebe* sp.; located in the valley.	Yuntai mountain scenic spot, 625 m	Thin limestone soil, moist
IV	Nature coniferous and broadleaved mixed forest; the representative plant: *Cupressus funebris*; located near village.	Heichong spot, 1 007 m	Limestone soil
V	Coniferous plantation; the representative plant: *Cunninghamia* sp.; located near village.	Heichong spot, 884 m	Thick yellow soil
VI	Coniferous plantation; the representative plant: *Pinus massoniana*; located near farmland.	Heichong spot, 871 m	Thick yellow soil
VII	Plantation bamboo grove; the representative plants: *Bambusa* spp.; located in valley.	Shamu river spot, 687 m	fluvo-aquic soil where humus accumulation was weak
VIII	Natural shrub; the representative plant: *Distylium dunnianum*; located in valley.	Shamu river spot, 423 m	fluvo-aquic soil where humus accumulation was weak

the Pielou's index (E), which is calculated with $E = H'/\ln(s)$; and dominance was determined with the Berger-Parker index (D), which is calculated with $D = N_{max}/N$.

P_i is the proportion of individuals of genus i found in the community, N_{max} is the number of individuals in the most abundant genus, and N is the total number of individuals from each site. Shannon-Wiener and Pielou indices are widely used in studies of soil fauna (Lamoncha and Crossley, 1998; Kaneko and Salamanca, 1999; Horwood and Butt, 2000; Arroyo *et al.*, 2005; Lindberg and Bengtsson, 2006; Ivan, 2009; Fu and Fu, 2011). While the Berger-Parker index is not as widely used as others, it is an effective and practical tool for environmental monitoring of oribatid mites (Caruso *et al.*, 2007).

A comparison between oribatid communities was performed using Jaccard's similarity coefficient, $C_J = a/(a+b+c)$ (Magurran, 2004), where a is the total number of genera present in both samples, b is the number of genera present in only the sample being analyzed, and c is the number of genera present only in a second sample. No similarity and moderate dissimilarity between the two communities if C_J is 0 – 0.25 and 0.25 – 0.5, respectively (Shen, 1992).

Marczewski-Steinhaus distance (C_{ms}) and Bray-Curtis dissimilarity were used for cluster analysis (average clustering method) with R ver. 2.11.1 software for statistical computing and graphics. The original count matrix was converted to a binary matrix when C_{ms} was used for cluster analysis. C_{ms} is in fact the complement of the Jaccard similarity index, $C_{ms} = 1 - C_J$. The original count matrix was not converted to a binary matrix when Bray-Curtis dissimilarity was used for cluster analysis based on the number of individuals of the specified taxa.

3 RESULTS

3.1 Composition and distribution of soil oribatids

The soil samples collected in this study contained a total of 1 170 oribatid mites belonging to 56 genera and 33 families (Table 2).

The most abundant genera (individuals > 10%) were *Perscheloribates* (263 individuals, 22.48%) and *Protoribates* (134 individuals, 11.45%). The other abundant genera (1% – 10%) included *Scheloribate* (9.91%), *Suctobelbella* (8.03%), *Eohypochthonius* (6.32%), *Tectocepheus* (5.38%), *Epilohmannia* (4.87%), *Trhypochthonius* (3.50%), *Peloribates* (3.33%), *Ramusella* (2.82%), *Oppiella* (2.39%), *Papillacarus* (2.14%), *Nothrus* (2.14%) and *Cultroribula* (1.28%). These data indicate that the area has a few dominant genera and many rare ones.

In general, taxa with greater abundance were also more widely distributed. *Protoribates*, the most widespread genus, was recorded in all eight surveyed sites. *Epilohmannia*, *Oppiella*, *Suctobelbella* and *Tectocepheus* were also very common and occurred in seven sites with exceptions of either site VII or VIII for each respective genus. Thirty-five genera were distributed in only one or two sites.

Protoribates was second only to *Perscheloribates*

Table 2 Community composition and distribution of soil oribatids in eight sites of karst forests in Shibing, Guizhou

Genera	Number of individuals								Total	Proportion (%)
	Ⅰ	Ⅱ	Ⅲ	Ⅳ	Ⅴ	Ⅵ	Ⅶ	Ⅷ		
Indotoritia					1				1	0.09
Archoplophora	1			3	3				7	0.60
Acrotritia		3		1	2				6	0.51
Phthiracarus		1							1	0.09
Steganacarus		1		1					2	0.17
Hoplophthiracarus					1				1	0.09
Apoplophora			2		4				6	0.51
Eohypochthonius			23	21	5	11	13	1	74	6.32
Hypochthonius			1	2	1	3			7	0.60
Malacoangelia			1						1	0.09
Epilohmannia	2	8	24	10	10	1		2	57	4.87
Papillacarus	15			9	1				25	2.14
Malaconothrus		5							5	0.43
Trimalaconothrus		3							3	0.26
Trhypochthonius	7	1		11		22			41	3.50
Allonothrus				4					4	0.34
Nothrus	5		1	7	2	9		1	25	2.14
Nanhermannia					1				1	0.09
Masthermannia			1		2				3	0.26
Cyrthermannia			2						2	0.17
Damaeus				1					1	0.09
Belba	2		4	3					9	0.77
Heterobelba	1		2						3	0.26
Eremulus			4	6					10	0.85
Eremobelba	1								1	0.09
Microppia	1								1	0.09
Medioppia	2		1						3	0.26
Ramusella	6		12	9		6			33	2.82
Lauroppia	1		4	1					6	0.51
Multioppia		1			1				2	0.17
Arcoppia		3			2				5	0.43
Oppiella	13	1	2	2	1	8	1		28	2.39
Allosuctobelba			2		8			1	11	0.94
Suctobelbella	11	15	17	33	4	10	4		94	8.03
Dolicheremaeus	1				2				3	0.26
Fosseremus	1		1	1			1		4	0.34
Tectocepheus	8	7	1	18	7	17		5	63	5.38
Cultroribula	4			1		10			15	1.28
Gustavia			4						4	0.34
Austroceratoppia					2				2	0.17
Yoshiobodes			1		1				2	0.17
Oribatella			1						1	0.09
Scheloribate	5		4	94	3	7		3	116	9.91
Perscheloribates	68	6	109	72	5			3	263	22.48
Trachyoribates	4					7			11	0.94
Peloribates	36		3						39	3.33
Protoribates	6	27	55	20	16	2	2	6	134	11.45
Plasmobates			1						1	0.09
Ceratozetes				7					7	0.60
Neoribates	1		1						2	0.17
Trichogalumna		3	1	4	1				9	0.77
Pergalumna	1	2							3	0.26
Galumna	1					4			5	0.43
Galumnella			4						4	0.34
Galumnida sp.				1					1	0.09
Microzetidae sp.			1		1				2	0.17
Subtotal	204	87	290	342	87	117	21	22	1 170	100.00

in abundance, being a dominant taxon in four sites of either broadleaved forest or coniferous forest and valley shrub, and present in all eight sites. *Perscheloribates* was the most abundant taxon, especially in sites I and III, but was not recorded in sites VI and VII. *Eohypochthonius*, recorded in six sites including in an unfavorable environment, was the prominent dominant taxon in site VII, representing 61.90% of all oribatids.

The three genera of abundant individuals, *Perscheloribates*, *Eohypochthonius* and *Papillacarus*, were pantropical and subtropical, while the others were cosmopolitan.

3.2 Diversity of soil oribatids

Table 3 presents the values of the species diversity indices of oribatids in eight sites. The richness index was the highest in the site III (31 genera), and the number of individuals was the highest in site IV (342 individuals). Both the richness index and the number of individuals were the lowest in sites VII and VIII; five genera were recorded in site VII, eight in site VIII, and the number individuals was less than 2% of total individuals in both sites. Natural forests supported 52 genera (site I – IV, VIII), 48 of these 52 genera were found in natural evergreen and deciduous broadleaf forests, and 16 genera were endemic to such forests. Plantation forests supported 32 genera (site V – VII).

The highest diversity value (2.8597) was found in site V (*Cunninghamia* forest), followed by sites VI (2.4269) and IV (2.4031). The number of individuals in site V was not the highest, but richness value was higher (26 genera) and the most abundant group (*Protoribates* and *Epilohmannia*) took a small proportion of the oribatids (29.88%). Site III exhibited the highest richness value and more number of individuals. At site III, because the most abundant groups (*Perscheloribates* and *Protoribates*) occupied relatively greater proportion of the overall oribatid population (56.56%), the diversity index of site III was as relatively low (2.2160). With fewer numbers and taxa, and a higher proportion of the most abundant group, the diversity indices of sites VIII and VII were 1.8740 and 1.1266, respectively.

The Berger-Parker index was the lowest in site V; the next lowest was found successively in sites VI, VIII, IV, II, I, III, VII. In general, the values were lower in the coniferous plantation and higher in the bamboo grove.

3.3 Community comparison of soil oribatids

The Jaccard similarity coefficients between all sites were considerably low (0.1481 – 0.4444) (Table 4). It was the highest (0.4444) between site I and site IV, and the lowest (0.1481) between site I and site VII, and between site V and site VII. These results indicate that the oribatid assemblages at all sites are not similar to one another, even between sites of the same vegetation type.

None of the dendrograms constructed with Marczewski-Steinhaus distance and Bray-Curtis dissimilarity showed a very clear community pattern of oribatid distribution based on vegetation type, soil type, elevational gradient and human disturbance (Fig. 1). The two dendrograms suggested that the oribatid communities of the three sites of natural evergreen and deciduous broadleaf forests belonged to different types. According to Bray-Curtis dissimilarity, the communities of the eight sites could be divided into five types: Type A in natural coniferous-broadleaved mixed forest and broadleaved forest (site I, III, IV); Type B in *Pinus massoniana* forest (site VI); Type C in valley shrub (site VIII); Type D in bamboo forest of valley (site VII); and Type E in *Cunninghamia* forest (site V) and broadleaved forest (site II). The environmental factors are comparatively different between sites II and V.

Table 3 Diversity of soil oribatids in eight sites of karst forests in Shibing, Guizhou

Diversity measurements	I	II	III	IV	V	VI	VII	VIII
S	26	16	31	26	26	14	5	8
H'	2.3800	2.2448	2.2160	2.4031	2.8597	2.4269	1.1266	1.8740
E	0.7305	0.8097	0.6394	0.7376	0.8777	0.9196	0.7000	0.9012
D	0.3333	0.3103	0.3759	0.2749	0.1839	0.1880	0.6190	0.2727

Table 4 Jaccard's similarity coefficient in eight sites of karst forests in Shibing, Guizhou

Site	II	III	IV	V	VI	VII	VIII
I	0.2353	0.3902	0.4444	0.2683	0.4286	0.1481	0.2143
II		0.1750	0.3125	0.3125	0.2500	0.1667	0.2000
III			0.3902	0.3902	0.2857	0.1613	0.2581
IV				0.3684	0.4286	0.1923	0.2593
V					0.2903	0.1481	0.3077
VI						0.2667	0.3750
VII							0.1818

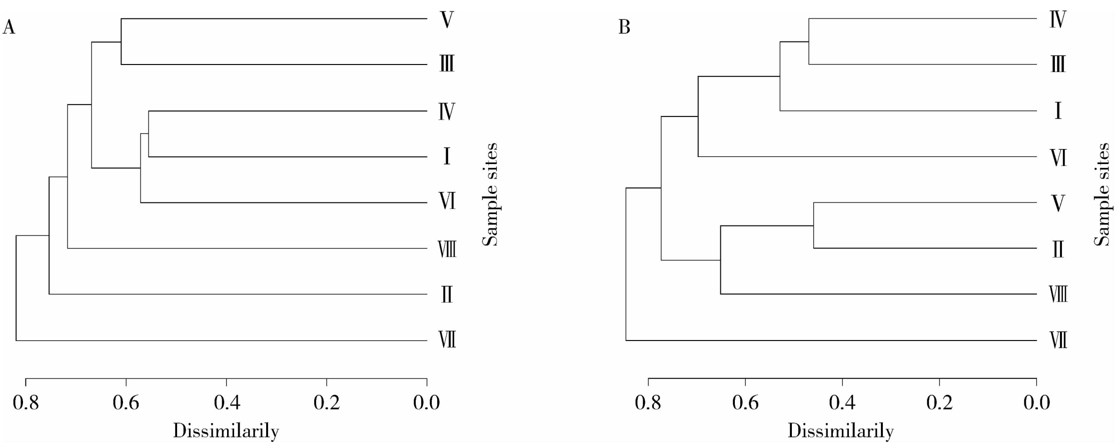

Fig. 1 Cluster analysis dendrograms of the oribatid communities in eight sites of karst forests in Shibing, Guizhou

The Cluster analysis was carried out using Marczewski-Steinhaus distance (A) and Bray-Curtis dissimilarity (B). The average clustering method was applied.

4 DISCUSSION

The microhabitat was complex in Shibing, and some typical habitats were neglected in this investigation because of the difficulty in sampling all habitats. For example, some forest patches were not selected as sampling sites because the soil was as thin as -1 cm and the trees grew from stone crevices. However, it seems clear that additional collections of oribatid mites would significantly increase the generic richness caused by the habitat diversity within this area. The oribatids collected in the present investigation had pantropical and subtropical characteristics at the genus level, which would be expected to be more notable with further extensive investigation.

The present study recorded 56 genera, among which *Perscheloribates* and *Protoribates* were the first and second most abundant taxa, respectively. *Protoribates* was the dominant genus in four sites and was present in all eight sites, making it the most successful taxon in adapting to the karst forest environment in Shibing. *Perscheloribates* was the most abundant genus, but was recorded in only six sites; this genus has a preference for natural evergreen and deciduous broadleaf forests.

Sites with natural evergreen and deciduous broadleaf forests supported rich individuals and genera; here, the soil was lime (alkaline soil) with a poor humus layer. The coniferous plantations (sites V and VI) with acid soil had fewer individuals and genera. These results were not identical with previous studies (Maraun and Scheu, 2000; Erdmann *et al.*, 2012) in forests of the temperate zone, where the oribatid mites have a preference for a thick, withered litter layer and the soil that was relatively acid. This study suggested that the natural forests in karst areas in Southwestern China, especially evergreen and deciduous broadleaf forests, serve as an "ark" or refugium for soil oribatid mites, protecting these mites against serious deterioration of the environment.

Although greater numbers of individuals and genera were observed in sites of natural evergreen and deciduous broadleaf forests, the population numbers in a few genera accounted for the majority of the total number of individuals, *i. e.*, the oribatid communities were strongly dominated by only a few genera, with a high genus turnover rate, which is the typical pattern for unstable ecosystems (Luptáčik *et al.*, 2012). The natural evergreen and deciduous broadleaf forests were vulnerable because the soil layers were very thin making them prone to soil erosion; this probably affected the nature of the oribatid communities.

The highest Shannon and the lowest Berger-Parker indices of the oribatid mite communities were not observed in the natural evergreen and deciduous broadleaf forests, but in coniferous plantations. Higher oribatid diversity has been shown to reflect a less interfered biotic community (Arroyo *et al.*, 2005; Maribie *et al.*, 2011; Luptáčik *et al.*, 2012), and the Berger-Parker index increases from undisturbed to disturbed areas (Caruso *et al.*, 2007). The coniferous plantations are near a village and often disturbed by human activities, such as tree-felling; they are typically mature forests with thick litter layers. The oribatid communities in these coniferous forests were relatively stable because the litter provided the mites with an available food resource, moderated the effects of extreme temperatures, and also reduced the loss of soil moisture (Coleman *et al.*, 2002; Maribie *et al.*, 2011). The natural evergreen and deciduous broadleaf forests are typical karst forests with very thin and poor soil, and these environments are susceptible to erosion and are not very stable (Zhu, 1997). Even though direct human disturbance in these forests (site I, II and III) was less than in the plantation forests (site V and VI), the ability of the oribatid communities to resist disturbance was weakened as indicated by the relatively low Shannon indices and the high Berger-Parker indices of the mite communities.

Bamboo in site VII was planted as a tourist attraction; here, plant diversity was very low and soil was fluvo-aquic. Because the vegetation lacked diversity and experienced anthropogenic disturbance, in site VII the Shannon index was the lowest and the Berger-Parker index was the highest.

A high Berger-Parker index generally means a low diversity index, and *vice versa*. But site VIII had low oribatid diversity and Berger-Parker index due to high Pielou's index.

No significant correlation was observed between the Jaccard similarity coefficient and the vegetation, soil type or distance of sites. The oribatid assemblages at all eight sites were not similar to one another, which was likely the result of the diverse environments in the karst areas analyzed here. According to the cluster dendrograms, the oribatid communities of three sites of natural evergreen and deciduous broadleaf forests showed different and complicated types, suggesting that there is significant microhabitat heterogeneity among these forests.

The species diversity and community stability of oribatids were affected by unique ecologic characteristics, such as fragility and heterogeneity, of the karst ecosystem with different forest types. The evergreen and deciduous broadleaf forests ecosystem was rich in oribatid mites; oribatid mites may find a refugium or an "ark of refuge" in these sites. However, the ecosystem is so sensitive to human and natural disturbances that it is very difficult and time-consuming to restore the disturbed forests in this area (Wang *et al.*, 2003). In addition, oribatid mites are sensitive arthropods having a strong response to changes in habitat and it takes much longer time to restore their populations and diversity than other animals (Lindberg and Bengtsson, 2006). Therefore, protecting natural forests and vegetation diversity by minimizing human disturbance such as tourism and farming activities is important in these karst areas.

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贵州施秉喀斯特地区林地土壤甲螨的群落组成及多样性

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摘要：为了解施秉喀斯特地区林地土壤甲螨的分布和群落组成特点，明确中国西南喀斯特地区林地类型对土壤甲螨群落密度、组成和物种多样性的影响，对该区林地土壤甲螨的群落结构及多样性进行了的调查和分析。【方法】2012 年 8 月选取了中国西南施秉喀斯特地区典型生境中的 8 个样地，每个样地 9 个取样点，用 Berlese-Tullgren 装置分离土样 24 h。多样性分析采用常见的多样性指数；群落相似性分析采用 Jaccard 相似性系数(C_J)；群落聚类分析分别采用 Marczewski-Steinhaus 距离(C_{ms})和 Bray-Curtis 距离，应用 R 2.11 程序进行类平均法聚类。【结果】结果显示，中国西南喀斯特 8 个样地中土壤甲螨由少数的优势属和数量众多的稀有属组成。其中全菌甲螨属 *Perscheloribates* (22.48%)和长单翼甲螨属 *Protoribates* (11.45%)个体数量最为丰富。长单翼甲螨属 *Protoribate*，、上罗甲螨属 *Epilohmannia*、小奥甲螨属 *Oppiella*、小盾珠甲螨属 *Suctobelbella* 和盖头甲螨属 *Tectocepheus* 分布广泛。本区的甲螨组成(属级水平)表现出明显热带和亚热带地区特点。在天然常绿落叶阔叶林中，甲螨的个体数量和种类数较多，但多样性不高，而在人工针叶林中甲螨多样性最高。甲螨群落组成和分布特征多样，异质性高，特别是在天然常绿落叶阔叶林中突出。【结论】研究表明，施秉喀斯特生态系统的不同林分影响甲螨的物种多样性和群落稳定性，天然常绿落叶阔叶混交林是甲螨的“避难所”。

关键词：甲螨；群落组成；物种多样性；喀斯特地区；施秉；中国西南

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